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CLAIMS

1. An optical modulator (1) comprising

- an optical splitter (11a; 11b) for splitting an input light beam into a first and second light beam;

5   - a first and a second waveguide arm (9, 12) connected to said optical splitter (11a; 11b) for receiving and transmitting therethrough said first and second light beam, respectively, said waveguide arms (9, 12) each including a core region (32) comprising a group IV semiconductor

10 material or a combination of group IV semiconductor materials;

- an optical combiner (14a; 14b) connected to said first and second waveguide arm (9, 12) for receiving said first and second light beam and combine them into an output light

15 beam;

- a first and a second electrode structure (20, 21) associated with said first and second waveguide arm (9, 12), respectively;

- a driving circuit (80) for supplying voltage to said

20 first and second electrode structure (20, 21);

characterized in that said driving circuit (80) is adapted to supply a first modulation voltage superimposed to a first bias voltage to the first electrode structure (20) and a second modulation voltage superimposed to a second

25 bias voltage to the second electrode structure (21).

2. An optical modulator (1) according to claim 1, wherein the optical splitter (11a; 11b) is a symmetric splitter adapted to split the input optical beam in two light beams of substantially the same optical power.

30 3. An optical modulator (1) according to claim 1 or 2, wherein the first and second waveguide arm (9, 12) are substantially of the same length.

4. An optical modulator (1) according to any of claims 1 to
3, wherein the group IV semiconductor material of each core
region (32) is selected from the group comprising Si and Ge
and a combination thereof.

5. An optical modulator (1) according to any of claims 1 to
4, further comprising a third electrode structure (22)
associated with one of the two waveguide arms (9, 12).

6. An optical modulator (1) according to claim 5, wherein
the driving circuit (80) is adapted to supply to the third
electrode structure (22) a CW voltage.

7. An optical modulator (1) according to any of claims 1 to
6, wherein the driving circuit (80) is adapted to supply
the first and second modulation voltage as electric signals
having the same waveform.

8. An optical modulator (1) according to claim 7, wherein
the driving circuit (80) is adapted to supply the electric
signals with inverted sign.

9. An optical modulator (1) according to any of claims 1 to
8 which is integrated on a silicon substrate.

10. A unit (70) comprising an optical modulator (1)
according to any of claims 1 to 9 and an electro-optical
converter (71) adapted to convert an input optical light
beam into a corresponding electrical signal.

11. A unit (70) according to claim 10, wherein the electro-
optical converter (71) is coupled to the optical modulator
(1) so as to supply the corresponding electrical signal to
the driving circuit (80) of the optical modulator (1).

12. A unit (70) according to claim 10, further comprising a
filtering element (72, 73).

13. A unit (70) according to claim 12, wherein the
filtering element (72, 73) is coupled to the electro-
optical converter (71).

14. A unit (70) according to claim 12 or 13, wherein the filtering element (72, 73) is coupled to the optical modulator (1).

5   15. A unit (70) according to any of claims 12 to 14, wherein the filtering element (72, 73) comprises a drop filtering element (72) coupled to the electro-optical converter (71) and an add filtering element (73) coupled to the optical modulator (1).

10   16. A unit (70) according to any of claims 10 to 15, wherein at least a portion of the electro-optical converter (71) comprises a group IV semiconductor material or a combination of group IV semiconductor materials.

17. A unit (70) according to claim 16, wherein the electro-optical converter (71) and the optical modulator (1) are
15   integrated on a silicon substrate.

18. A unit (70) according to any of claims 12 to 17, wherein the filtering element (72, 73) comprises a material selected from the group comprising a group IV semiconductor material, SiO_2, doped SiO_2, Si_3N_4, SiON and a combination
20   thereof.

19. A unit (70) according to claims 16 and 18, wherein the electro-optical converter (71), the optical modulator (1) and the filtering element (72, 73) are integrated on a silicon substrate.

25   20. A transmitting station (50) comprising an optical transmitter device (40), the optical transmitter device comprising an optical source (41) for providing an optical light beam at a predetermined wavelength and an optical modulator (1), according to any of claims 1 to 9,
30   associated with the optical source (41) to modulate the intensity of the optical light beam.

21. A transmitting station (50) according to claim 20, wherein the optical transmitter device (40) further

comprises an electro-optical converter (42) adapted to convert an input modulated light beam at a generic wavelength into a corresponding modulation electric signal, the electro-optical converter (42) being coupled to the

5   optical modulator (1) so as to supply said corresponding modulation electric signal to the driving circuit (80) of the optical modulator (1).

22. An optical communication system (60) comprising a transmitting station (50) according to claim 20 or 21 and

10   an optical communication line (54, 56) having a first end coupled to the transmitting station (50).

23. An optical communication system (60) according to claim 22, further comprising a receiving station (58) coupled to a second end of the optical communication line (54, 56).

15   24. An optical communication system (60) according to claim 22 or 23, further comprising a unit (70) according to any of claims 10 to 19.

25. A method for modulating the intensity of a light beam comprising the step of

20   a) splitting the light beam into a first and second light beam;

b) propagating said first and second light beam along a first and a second optical path, respectively;

c) combining said first and second light beam into an

25   output light beam after propagation along the first and second optical path;

d) introducing through Franz-Keldysh effect a relative phase shift between the two optical paths so as to obtain an intensity modulation of the output light beam;

30   characterized in that step d) is carried out by supplying a first modulation voltage superimposed to a first bias voltage to the first optical path and a second modulation

voltage superimposed to a second bias voltage to the second optical path.

26. A method according to claim 25, wherein in step a) the optical beam is split in two light beams of substantially
5   the same optical power.

27. A method according to claim 25 or 26, further comprising a step e) of supplying to at least one of the two optical paths a CW voltage for introducing a further prefixed relative phase shift between the two optical
10   paths.

28. A method according to any of claims 25 to 27, wherein in step d) a relative phase shift of π or an integer odd multiple thereof is introduced for obtaining a 0 logic state and a relative phase shift of zero or an integer even
15   multiple of π is introduced for obtaining a 1 logic state.

29. A method according to claim 28, wherein the first and second modulation voltage are electric signals having the same waveform.

30. A method according to claim 29, wherein the electric
20   signals have inverted sign.

31. A method according to claim 30, wherein the first and second bias voltage and the first and second modulation voltage are such as to induce through Franz-Keldysh effect an overall phase shift in the two optical paths which is
25   substantially the same in absolute value but opposite in sign when passing from the 1 logic state to the 0 logic state, and vice versa.

32. A method according to claim 31, wherein the first bias voltage is substantially the same as the second bias
30   voltage.

33. A method according to claim 32, wherein the peak to peak amplitude of the first modulation voltage is

substantially the same as the peak to peak amplitude of the second modulation voltage.

34. A method according to claim 31, wherein the first bias voltage is different from the second bias voltage.

5   35. A method according to claim 34, wherein the peak to peak amplitude of the first modulation voltage is different from the peak to peak amplitude of the second modulation voltage.

36. A method according to claim 30, wherein the first and
10   second bias voltage and the first and second modulation voltage are such as to induce through Franz-Keldysh effect an overall phase shift in the two optical paths which is different in absolute value and sign, when passing from the 1 logic state to the 0 logic state, and vice versa.

15   37. A method according to claim 36, wherein the first bias voltage is different from the second bias voltage.

38. A method according to claim 37, wherein the peak to peak amplitude of the first modulation voltage is substantially the same as the peak to peak amplitude of the
20   second modulation voltage.